

**REMARKS**

Process claims were allowed in the parent application. The present application is directed to novel defined layers or layer systems themselves.

Support for the amendment of claim 19 can be found in the present specification at page 6, line 19.

Applicants submit that the present claims, as amended to more clearly define the invention, are now in condition for allowance. Accordingly, review and reconsideration of the Office Action of June 28, 2004, is respectfully requested in view of the above amendments and the following remarks.

**Office Action**

The paragraphing of the Examiner is adopted.

**Paragraphs 1-4**

Claims 17-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

According to the Examiner, Claims 17 and 18 are rendered indefinite because

- it is not clear whether or not the clause "having controlled chain length and/or polydispersity on solid substrate surfaces" applied to both elements (i) and (ii) or just to element (ii).

- it is unclear whether the phrase "on solid substrate surfaces" refers to the solid substrate surface of the recited in line 1 of claim 17 or some other solid surface.

Further, Claim 19 is considered indefinite because it is unclear if the phrase "as initiator for an ATRP-mechanism" at the end of the claim is referring to L, I, or some other element.

In response, Applicants have amended Claims 17 and 19 for clarity. Withdrawal of the rejection is respectfully requested.

**Paragraphs 5-6**

Claim 17 is rejected under 35 U.S.C. 102(b) as being anticipated by US Patent 5,574,079 (Eaton et. al.).

Applicants respectfully traverse, in view of the amendment to claim 17.

Eaton et. al. teach: "The method of the present invention involves preparing a water-borne thermoplastic polyhydroxyether (phenoxy) resin dispersion by grafting one or more ethylenically unsaturated monomers ..... onto a thermoplastic polyhydroxyether having a narrow polydispersity. ( $M_w/M_n < 4$ ;  $7000 < M_n < 12,000$ )" ← see: column 2 lines 22-27.

With other words: The substrate is a thermoplastic resin of, how the inventors call it, "narrow" polydispersity onto which vinyl monomers are grafted conventionally (see column 2, lines 34-35) by radical polymerization (see column 2 line 37). There

is no information given neither on controlling the chain length nor on the polydispersity of the grafts.

Example 5 of Eaton et. al. teaches: "A water dispersion of the preferred narrow polydispersity thermoplastic polyhydroxyether resin of Example 4 is mixed with ..... and coated onto an aluminum test panel using a conventional "drawdown" bar method ....."

With other words: A prepared polymer resin is coated onto aluminum where it is bonded physically and not chemically by chemical bonds.

The difference between Eaton et. al. and the present invention clearly is that the present invention starts with an ATRP initiator bonded chemically on the surface of a solid from which an ATRP graft polymerization is initiated. Only the latter method is apt to produce substrates having bonded chemically a layer consisting of polymers or oligomers with controlled chain length and/or polydispersity and which each of the polymer or oligomer molecules being bonded to the surface.

Accordingly, the teachings of Eaton et. al. do not anticipate the present invention as claimed in Claim 17. Withdrawal of the rejection is respectfully requested.

#### **Paragraph 7**

Claims 17-19 are rejected under 35 U.S.C. §102(e) as being anticipated by US Patent 6,071,980 (Guan et. al.).

In Guan et. al. ATRP polymerization as cited in column 1 lines 42-54 is applied to prepare vinyl polymers.

The Examiner takes the position that "any polymer formed by atom transfer radical polymerization coated onto a substrate will inherently have a group anchoring it to the substrate (or else it would not be attached to the substrate)".

This argument is however technically not correct.

As already pointed out above, one has to differentiate between

- i) a coating which is physically bonded to a solid surface, that means deposition or adsorption of a polymer on the solid surface,
- ii) a coating which is chemically bound to a solid surface, that means binding the polymer to the solid surface by chemical bonds.

Guan et. al. only tell in column 4 lines 37-38 that "the polymers made by the process disclosed herein are useful as molding resins and for coatings". Nothing at all is reported in the form of a suggestion about chemical bonding of the coating. And nothing is reported about layer systems bonded to a solid substrate.

Claim 19 of the present application says explicitly: "A solid substrate surface having bonded thereto a compound of general formula (1) as initiator for an ATRP-polymerization". There is no doubt about it that "bonded" reads "chemically bonded".

Accordingly, the teachings of Guan et. al. do not anticipate the present invention as claimed in Claims 17-19. Withdrawal of the rejection is respectfully requested.

**Paragraph 8**

Claims 17-19 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent 5,807,937 (Matyjaszewski et. al.).

Applicants respectfully traverse.

Matyjaszewski et. al. teach: "The polymer may be used as a paint, coating, or coating agent" as cited in column 6 lines 52-53."

Here again the Examiner takes the position that "As a paint, coating, or coating agent, the material would necessarily be bonded to a surface."

Applicants respectfully traverse. This argument is not correct.

As already pointed out above, one has to differentiate between

- i) a coating which is physically bonded to a solid surface, that means deposition or adsorption of a polymer on the solid surface,
- ii) a coating which is chemically bonded to a solid surface, that means binding the polymer to the solid surface by chemical bonds.

Matyjaszewski et. al. is completely silent as to chemical bonding of the coating. And nothing is reported about layer systems bonded to a solid substrate.

Present Claim 19 on the other hand explicitly requires: "A solid substrate surface having chemically bonded thereto a compound of general formula (1) as initiator for an ATRP-polymerization".

Accordingly, the teachings of Matyjaszewski et. al. do not anticipate the present invention as claimed in Claims 17-19. Withdrawal of the rejection is respectfully requested.

**Paragraphs 9-10**

Claim 20 is rejected under 35 U.S.C. § 102(e) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Patent 6,071,980 (Guan et al.)

According to the Examiner, the coating of Guan et al. comprises all the structural limitations of Claim 20. The fact that Guan et al. omit teaching that the coating is formed by the process of Claim 20 is not relevant, since the Claim is directed to the product.

The position of the Examiner is not correct.

Guan et al. use ATRP in the presence of visible light to enhance polymerization time. The polymers prepared in accordance with the teachings of Guan et al. are not chemically bonded to a solid surface. Instead the preformed polymers may be used subsequently as coatings.

In claim 20 of the present application the ATRP initiator is chemically bonded to the solid surface via an anchor group A which in fact means that the initiator A-L-I is chemically bonded. As the ATRP polymerization initiated by I, in an interplay with a catalyst described by Matyjaszewski et al. in U.S. Patent 5,807,937, proceeds the ATRP initiator remains chemically bonded to the solid surface and the same is true for the growing graft polymer.

The moving-away of the polymer living site from the substrate surface does not affect at all the fact, that the growing polymer is chemically bonded to the solid surface.

Therefore the products prepared in Claim 20 of the present application are very much different from the polymers prepared by Guan et al. in U.S. Patent 6,071,980.

Again: The "Guan"-polymers may be used as coatings, but in this case they are not chemically bonded to a solid surface, in contrast they are only adsorbed or deposited on the surface which is a great and the crucial difference.

To give additional information presenting evidence to conclude that the product claimed in the present application differs from those of the prior art:

- Coatings on top of a solid surface bonded merely physically (for example prepared via spraying or dip-coating) might be removed from the substrate by suitable, even chemically unreactive solvents. - The surface of the substrate set free from the coating, in the chemical sense will be equivalent to the surface before the coating procedure.

Coatings bonded merely physically, in suitable, even chemically unreactive solvents suffer from loss of diffusion as not each of the polymer or oligomer molecules are bonded to the surface.

In fact, to stabilize a physically bonded coating on a surface of a solid to prevent dissolution, cross-linking is usually applied. But, also cross-linking does not chemically bind the coating to the surface of the solid.

- Coatings on top of a solid surface bonded chemically might be removed from the substrate only via means suitable to break the chemical bonds between the substrate and the coating., i.e. via procedures involving chemical reactions or severe mechanical processes. - Provided the coating being removed from the substrate via such procedures the surface of the substrate is not any more chemically equivalent to the surface before the coating procedures (with respect to functional groups).

Coatings bonded chemically as claimed in the present claims in chemically unreactive solvents don't suffer from the loss by diffusion as each of the polymer or oligomer molecules are bonded to the surface.

Accordingly, the teachings of Guan et al. do not anticipate nor render obvious the present invention as claimed in Claim 20. Withdrawal of the rejection is respectfully requested.

**Paragraph 11**

Claim 20 is rejected under 35 U.S.C. §102(e) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Patent 5,807,937 (Matyjaszewski et al.).

According to the Examiner, the coating of Matyjaszewski et al. comprises all the structural limitations of Claim 20. The fact that Matyjaszewski et al. omit teaching that the coating is formed by the process of Claim 20 is not relevant, since the Claim is directed to the product.

Applicants respectfully traverse. The argument of the Office is not correct

In claim 20 of the present application the ATRP initiator is chemically bonded to the solid surface via an anchor group A which in fact means that the initiator A-L-I is chemically bonded. As the ATRP polymerization initiated by I, in an interplay with a catalyst described by Matyjaszewski et al. in U.S. Patent 5,807,937, proceeds the ATRP initiator remains chemically bonded to the solid surface and the same is true for the growing graft polymer.

The moving-away of the polymer living site from the substrate surface does not affect at all the fact, that the growing polymer chain is chemically bonded to the solid surface.

Therefore the products prepared in present Claim 20 are very much different from the polymers prepared by Matyjaszewski et al. in U.S. Patent 5,807,937.

Again: The "Matyjaszewski"-polymers may be used as coatings, but in this case they are not chemically bonded to a solid surface, in contrast they are only adsorbed or deposited on the surface which is a great and the crucial difference.

To give additional information presenting evidence to conclude that the product claimed in 10/721,369 differs from those of the prior art:

- Coatings on top of a solid surface bonded merely physically (for example prepared via spraying or dip-coating) might be removed from the substrate by suitable, even chemically unreactive solvents. - The surface of the substrate set

free from the coating, in the chemical sense will be equivalent to the surface before the coating procedure. Coatings bonded merely physically, in suitable, even chemically unreactive solvents suffer from loss of diffusion as not each of the polymer or oligomer molecules are bonded to the surface.

In fact, to stabilize a physically bonded coating on a surface of a solid to prevent dissolution, cross-linking is usually applied. But, also cross-linking does not chemically bind the coating to the surface of the solid.

- Coatings on top of a solid surface bonded chemically might be removed from the substrate only via means suitable to break the chemical bonds between the substrate and the coating., i.e. via procedures involving chemical reactions or severe mechanical processes. - Provided the coating being removed from the substrate via such procedures the surface of the substrate is not any more chemically equivalent to the surface before the coating procedures (with respect to functional groups).

Coatings bonded chemically as described in U.S. Patent Application No. 10/721,369 in chemically unreactive solvents don't suffer from the loss by diffusion as each of the polymer or oligomer molecules are bonded to the surface.

Accordingly, the teachings of Matyjaszewski et. al. do not anticipate nor render obvious the present invention as claimed in Claim 20. Withdrawal of the rejection is respectfully requested.